**Figure 1   Network concept**

FIG 2A
6,1-Tree

FIG. 2B
Star (= 6,1-Tree)

FIG. 2C
Multi-leg Star

FIG. 2D
3,2-Tree

FIG. 2E
2-Mesh (complete)

FIG. 2F
2-Mesh (incomplete)
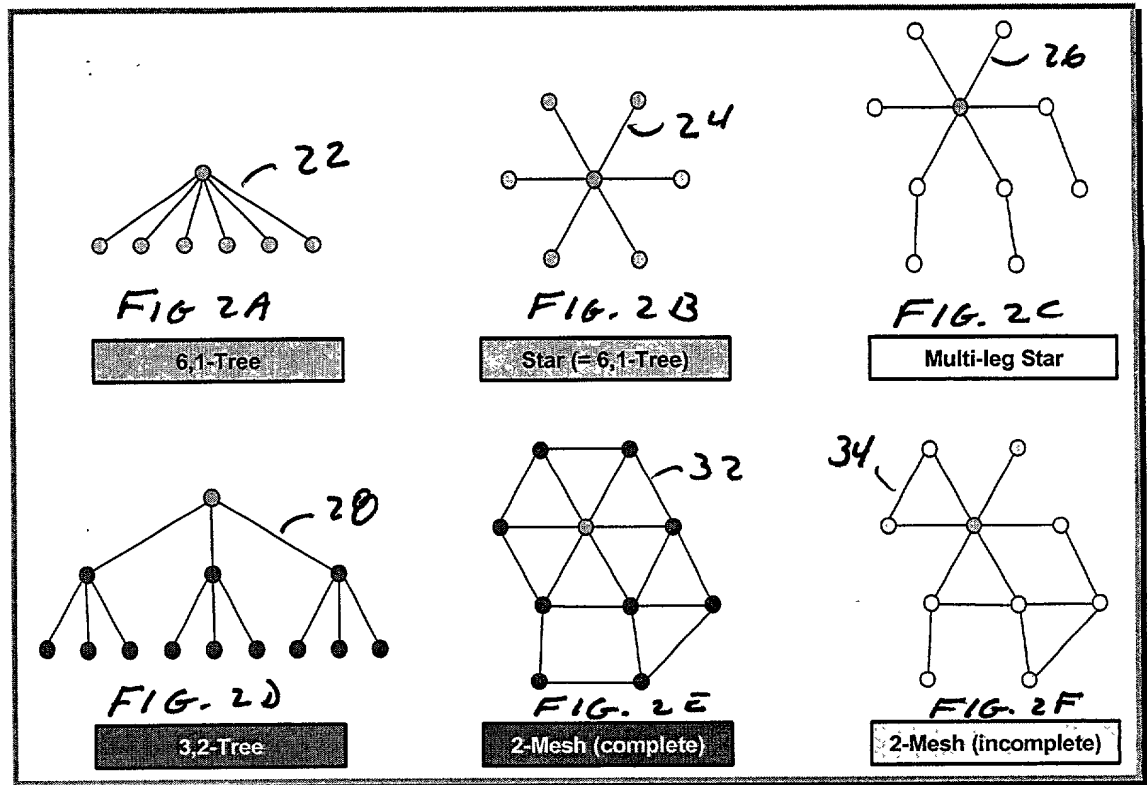
Figure 2   Mesh and mesh derivated network topology examples

36

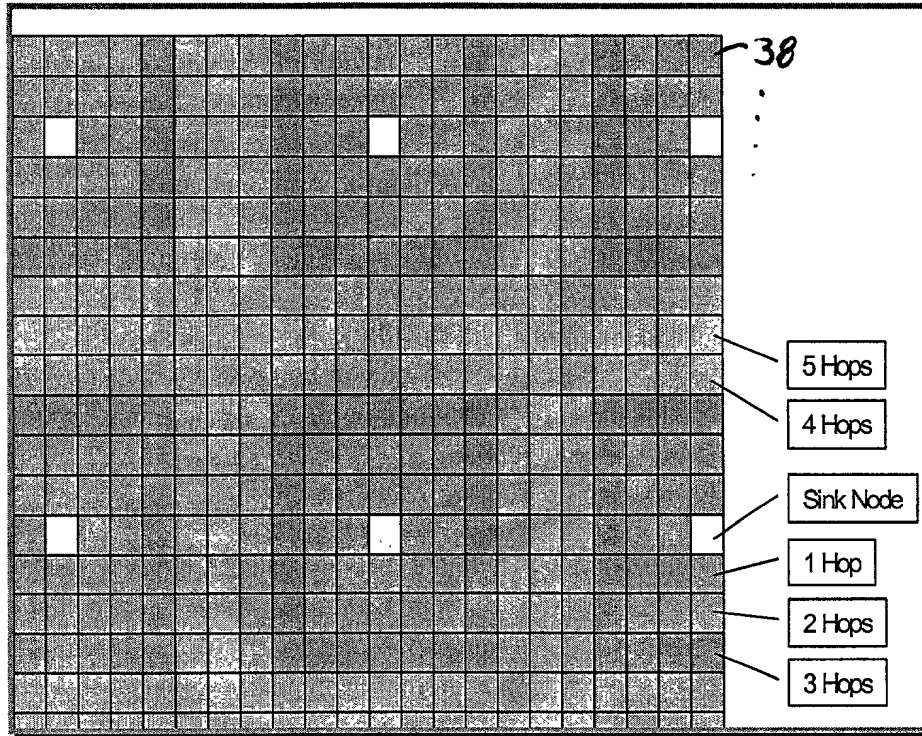38

5 Hops

4 Hops

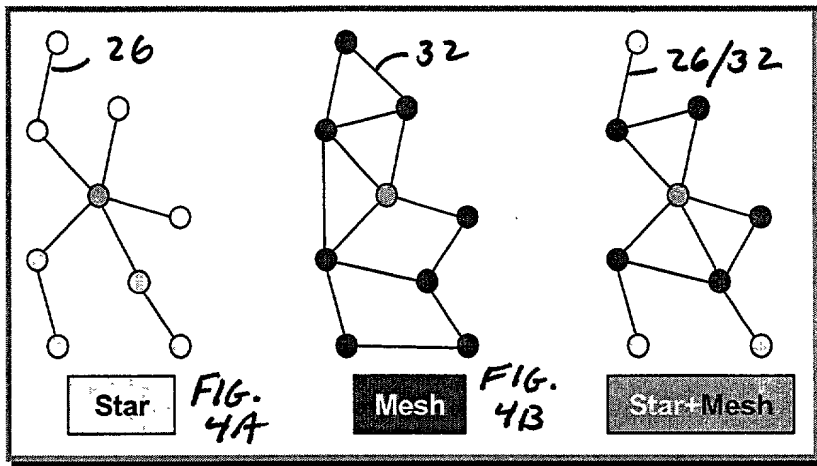Sink Node

1 Hop

2 Hops

3 Hops

**Figure 3   Square Grid**

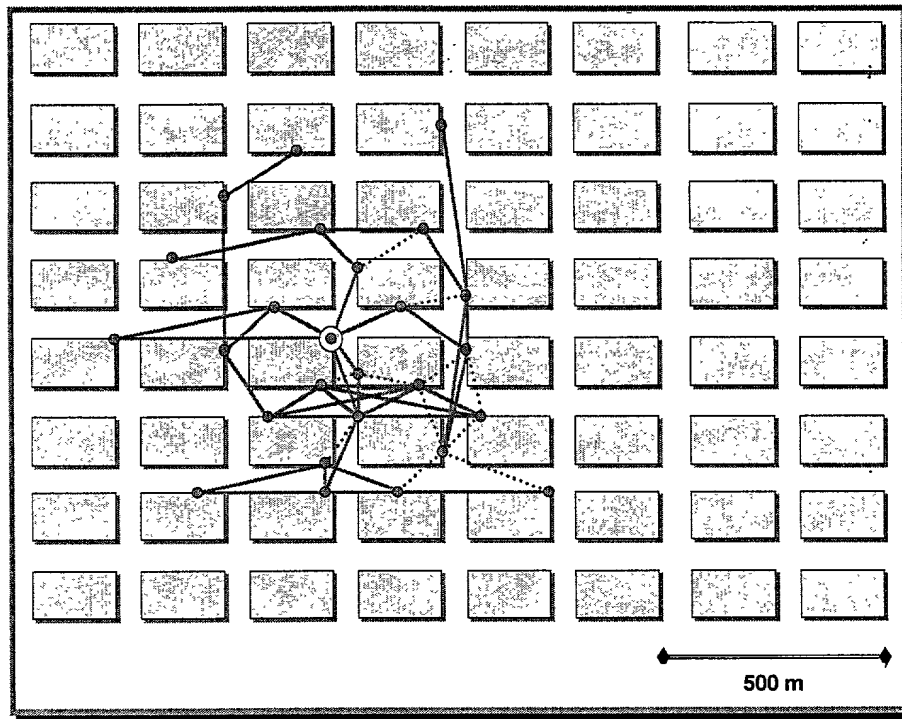Figure 4   Network topologies in the rural case

Figure 5   Ad-hoc Mesh network with 25 customers (all within 5 hops)

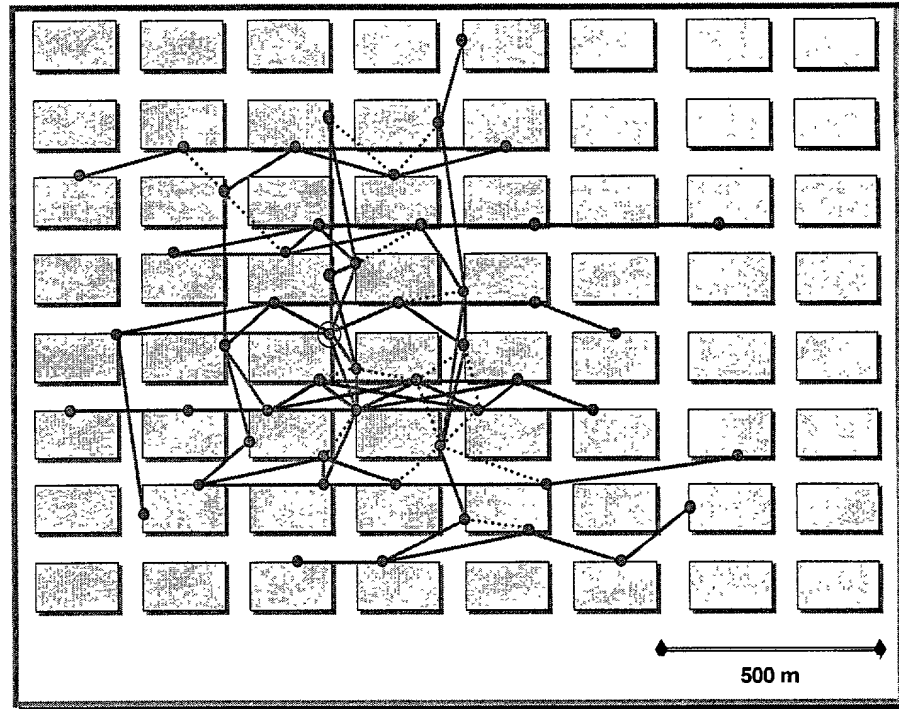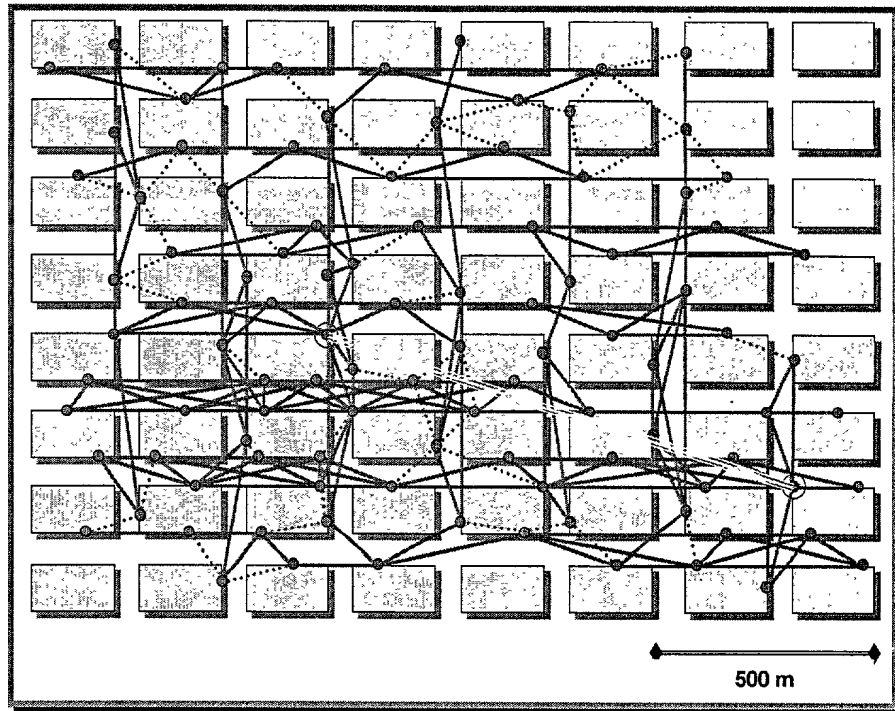**Figure 6   Ad-hoc Mesh network with 50 customers (all within 7 hops)**

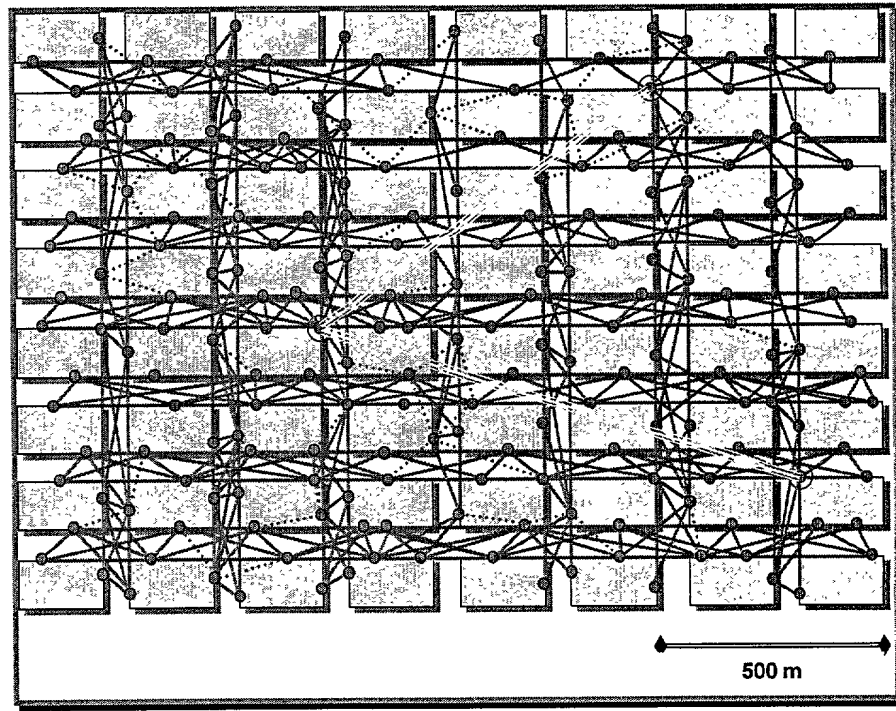**Figure 7   Ad-hoc Mesh network with 100 customers (all within 5 hops)**

500 m

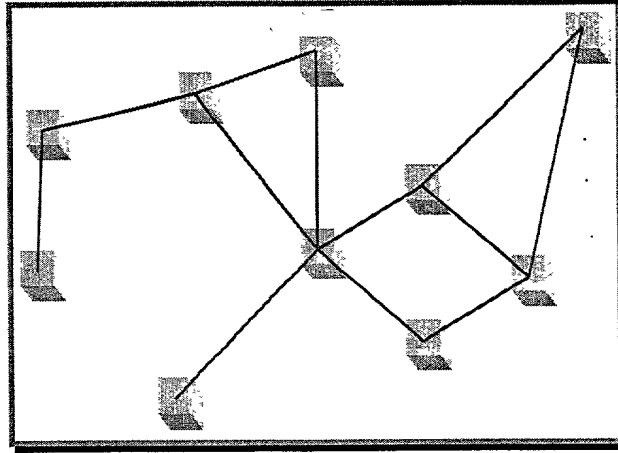Figure 8   Mesh network with 200 customers (all within 5 hops)
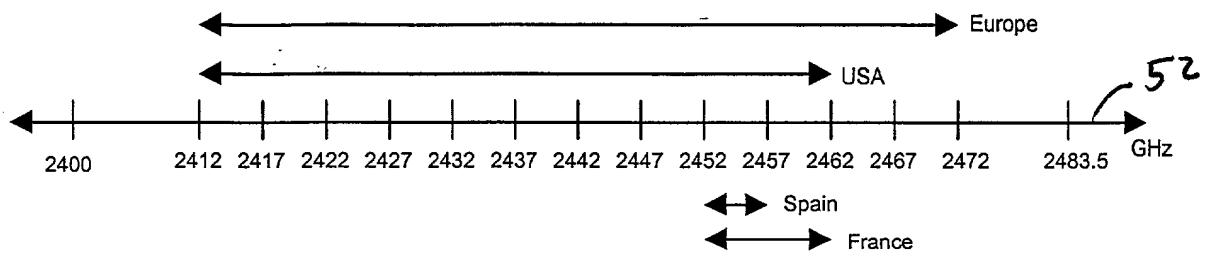
**Figure 9   Mesh network applied in rural case**

**Figure 10   ISM  band spectrum allocation**



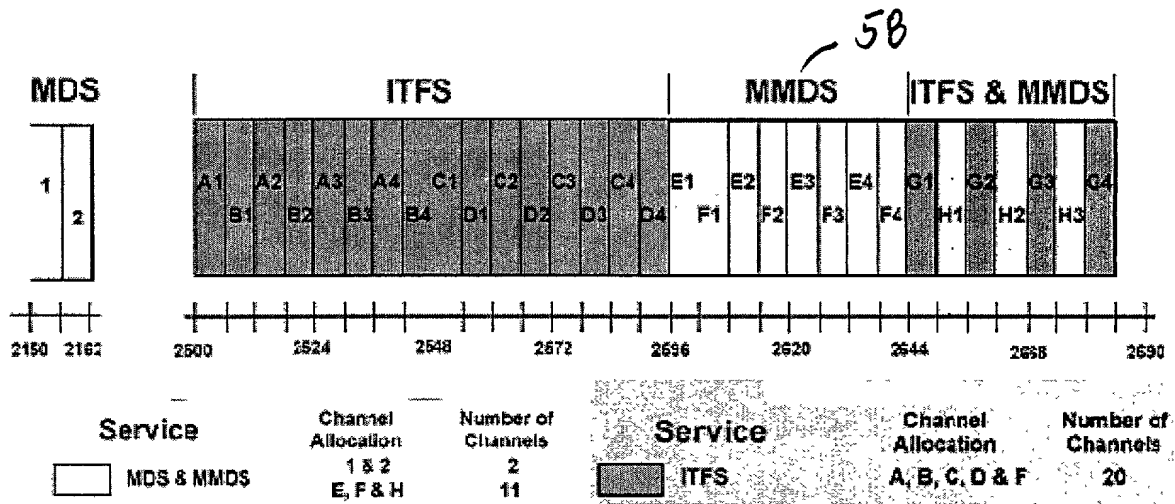| Service | Channel Allocation | Number of Channels | Service | Channel Allocation | Number of Channels |
|---------|-------------------|--------------------|---------|--------------------|--------------------|
| MDS & MMDS | 1 & 2 / E, F & H | 2 / 11 | ITFS | A, B, C, D & F | 20 |

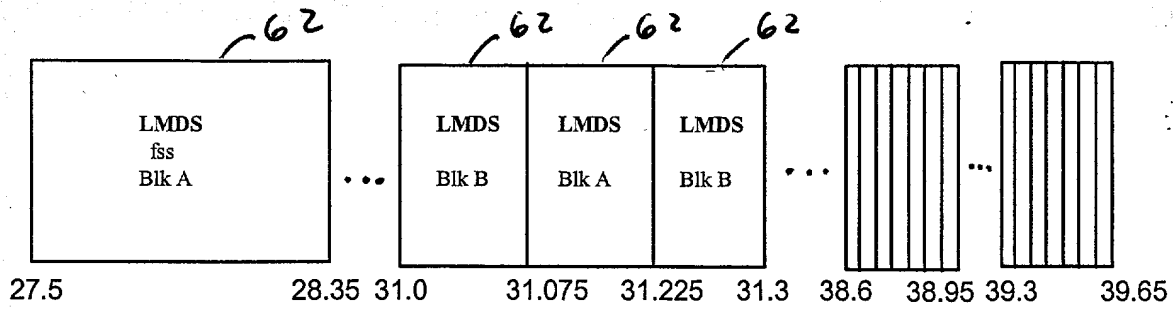**Figure 11   MMDS bandwidth allocation (USA example)**

Figure 12   LMDS bandwidth allocation (USA example)
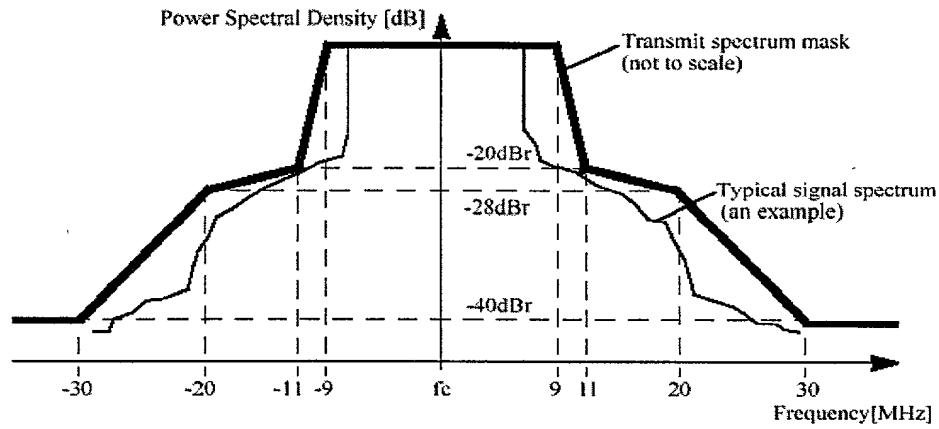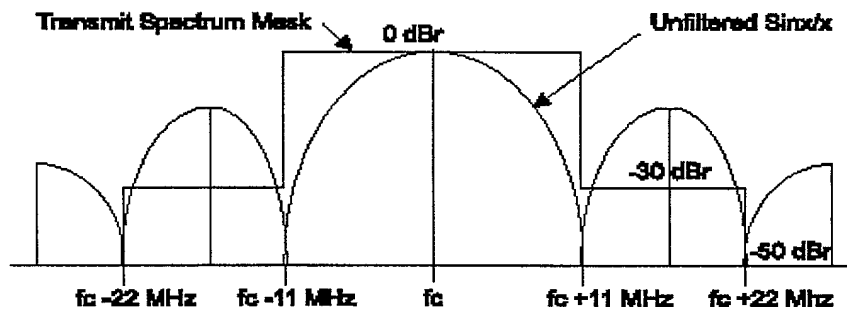


FIG. 13A



FIG. 13B

Figure 13   IEEE 802.11 Spectral masks: OFDM (11a) and DSSS (11 and 11b)
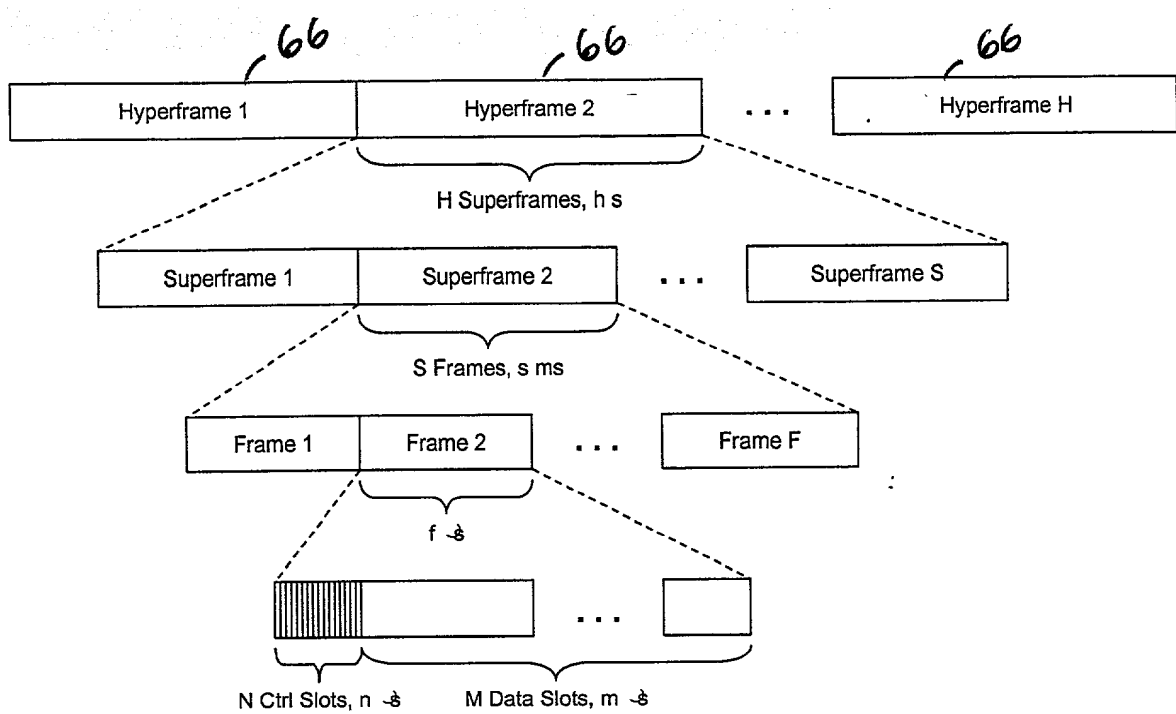
| Hyperframe 1 | Hyperframe 2 | ... | Hyperframe H |
|---|---|---|---|

H Superframes, h s

| Superframe 1 | Superframe 2 | ... | Superframe S |
|---|---|---|---|

S Frames, s ms

| Frame 1 | Frame 2 | ... | Frame F |
|---|---|---|---|

f s

N Ctrl Slots, n s     M Data Slots, m s

**Figure 14   Hyper-, Super- and Frame structure**



Extended Neighborhood
(Nodes within two hops
from the examined one)

Neighborhood
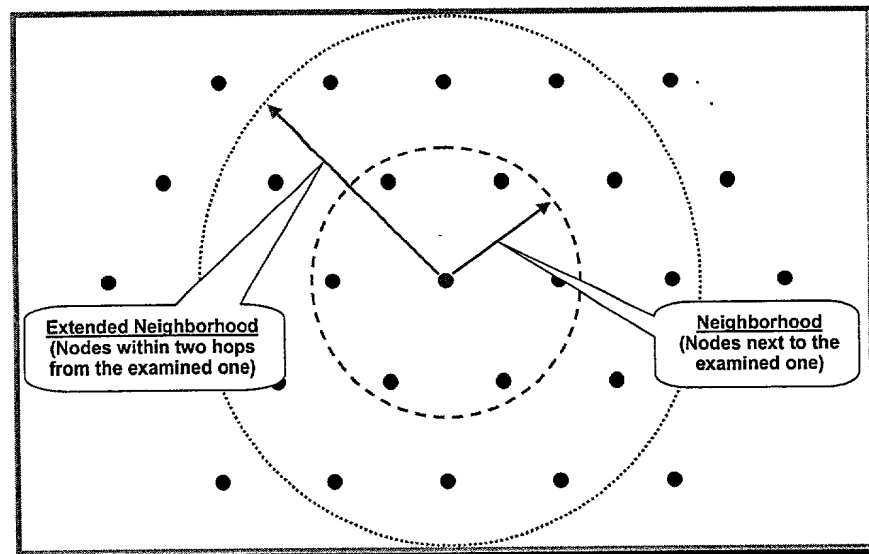(Nodes next to the
examined one)

**Figure 15   Neighborhood definitions**
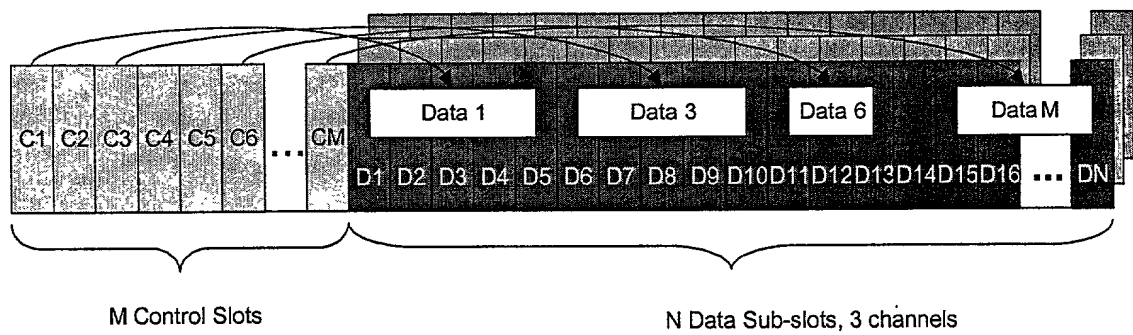
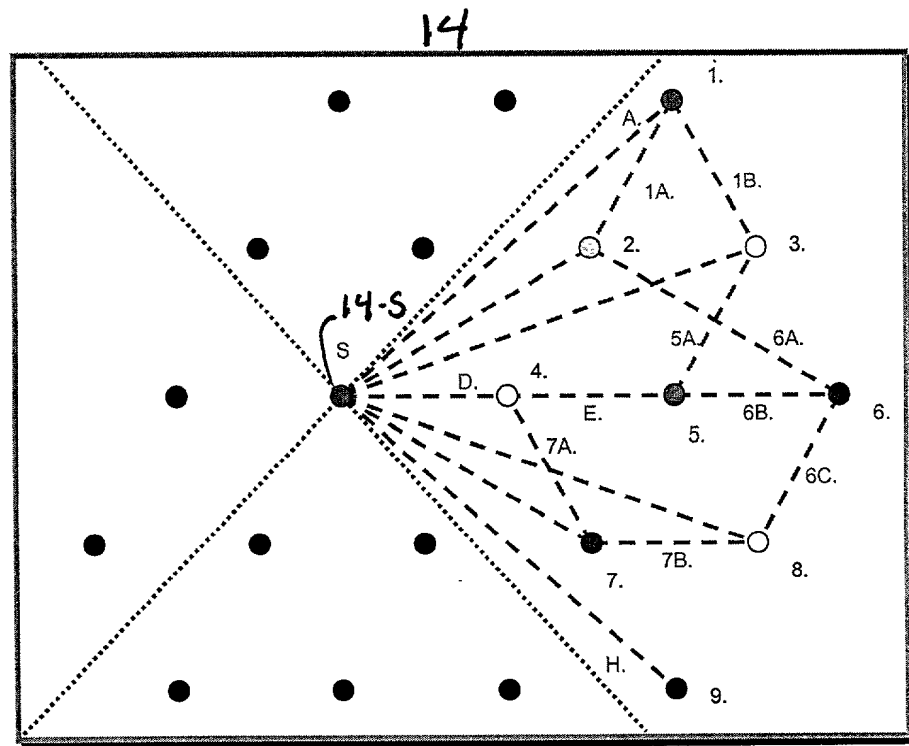**Figure 16   Data slot Reservation example**



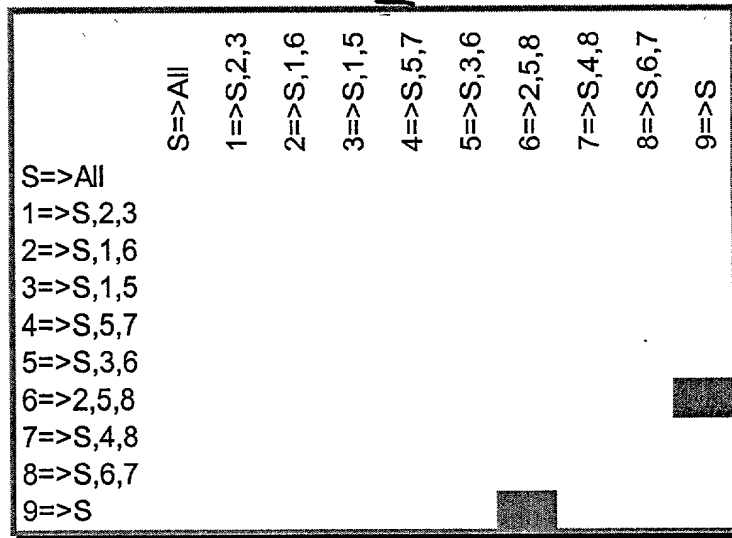**Figure 17   PMT Tier with 90⬜ sectors at the sink (S)**

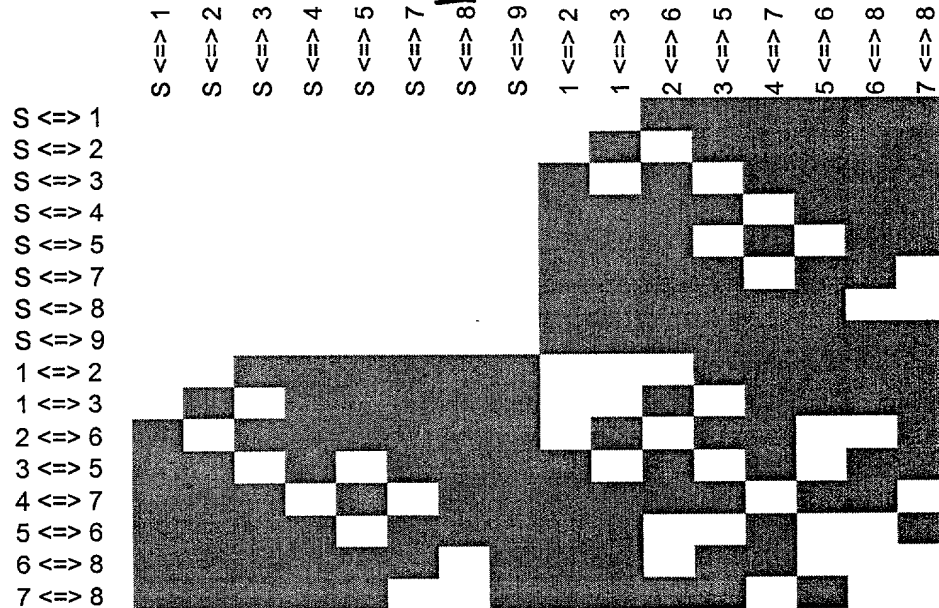**Figure 18  Multi-cast scheduling (gray denotes empty slot)**

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**Figure 19  Traffic matrix for network in Figure 17 (gray denotes slot available for simultaneous transmission)**
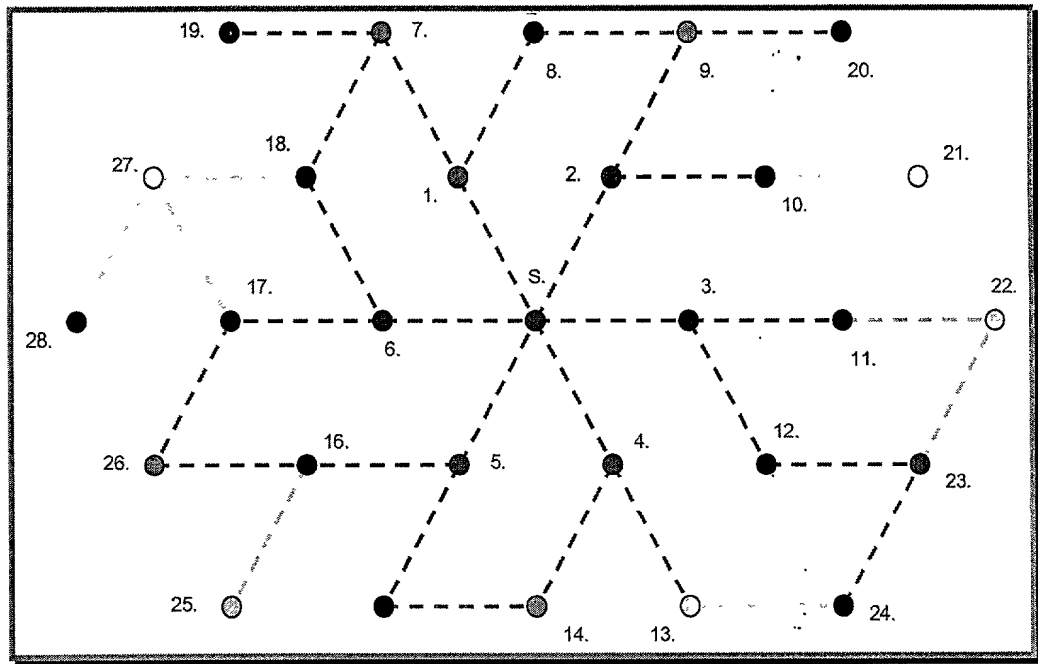
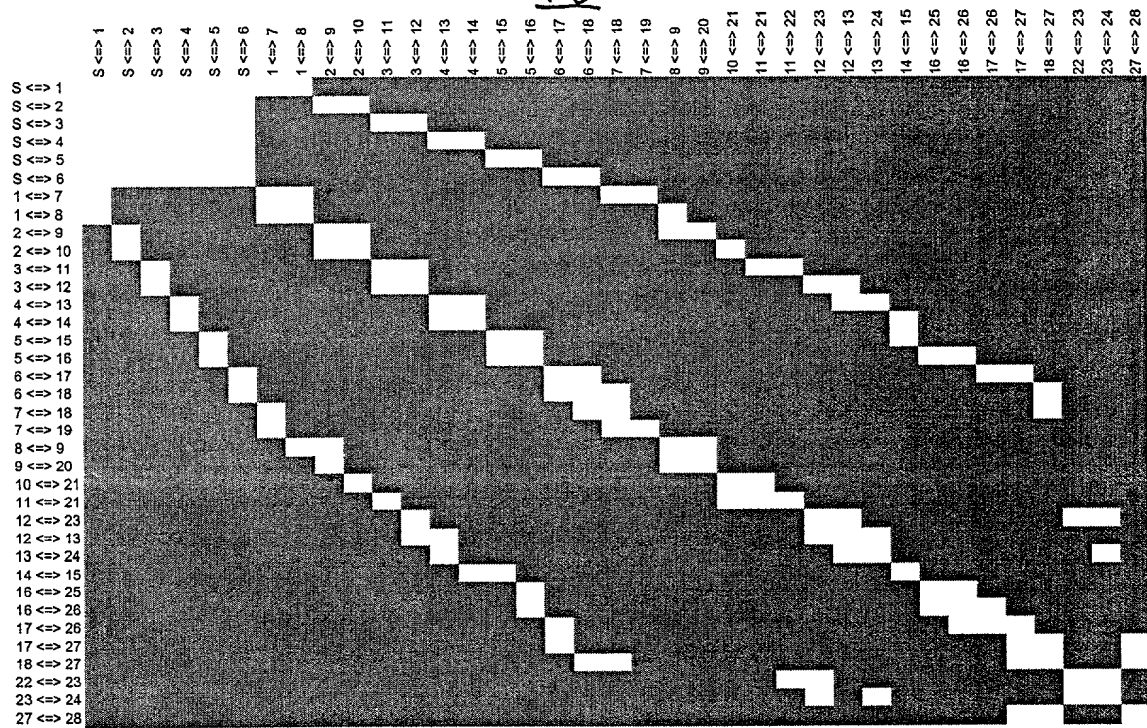**Figure 20  Mesh network based on PTP connections**

78



**Figure 21  Traffic matrix for network in Figure 20 (gray denotes slot available for simultaneous transmission))**
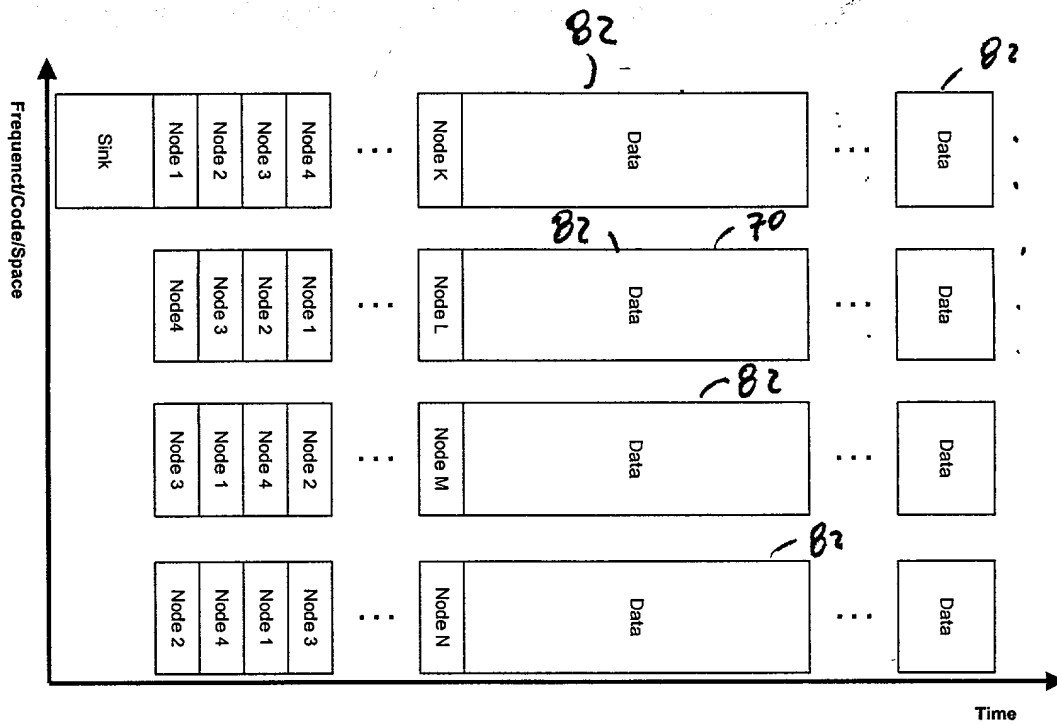
Figure 22 — PMT frame structure

Frequency/Code/Space (vertical axis)

Row 1: Sink | Node 1 | Node 2 | Node 3 | Node 4 | ... | Node K | Data | ... | Data
Row 2: Node4 | Node 3 | Node 2 | Node 1 | ... | Node L | Data | ... | Data
Row 3: Node 3 | Node 1 | Node 4 | Node 2 | ... | Node M | Data | ... | Data
Row 4: Node 2 | Node 4 | Node 1 | Node 3 | ... | Node N | Data | ... | Data

82
82  70
82
82

Time

**Figure 22   PMT frame structure**

Frequency/Code/Space/Hopping Pattern (vertical axis)

82
Row 1: Sink => All | Node 1=> S | Node 2=> S | Node 3=> S | Node 4=> S | Node 5=> S | Node 7=> S | Node 8=> S | Node 9=> S | Data | ... | Data

82
Row 2: Node 3=> 5 | Node 4=> 7 | Node 2=> 6 | Node 1=> 2 | Node 1=> 3 | Node 6=> 8 | Node 5=> 6 | Node 7=> 8 | Data | ... | Data

82
Row 3: Node 6=> 2 | Node 8=> 6 | Node 7=> 4 | Node 5=> 3 | Node 8=> 7 | Node 2=> 1 | Node 3 => 7 | Node 6=> 5 | Data | ... | Data
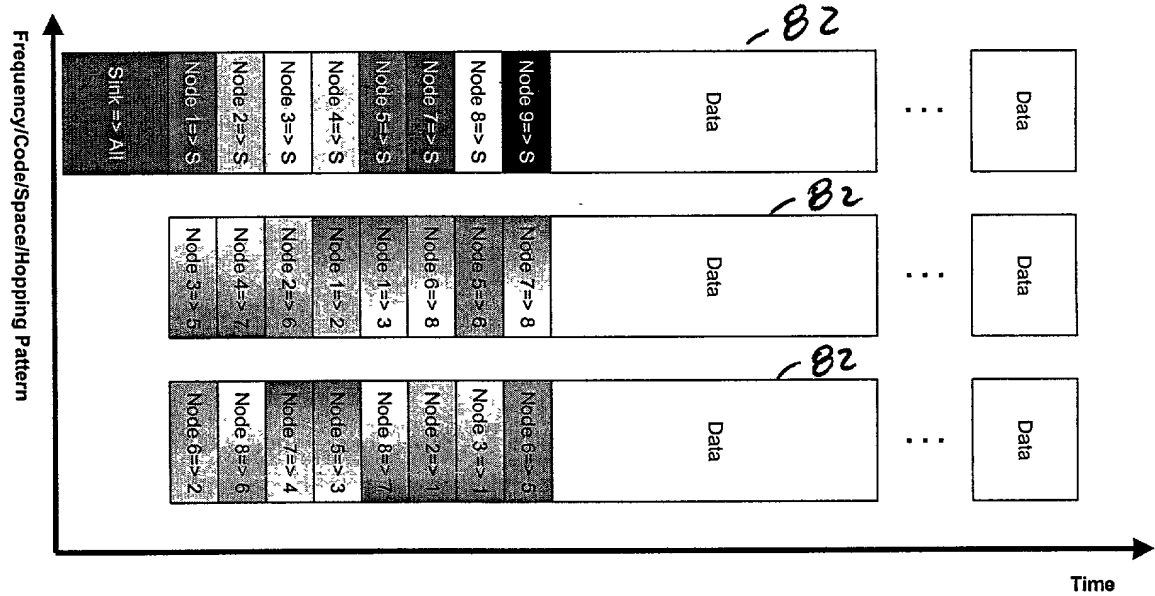
Time

**Figure 23   PMT control slot & channel allocation example for network in Figure 17 (assuming narrowbeam antennas at nodes).**
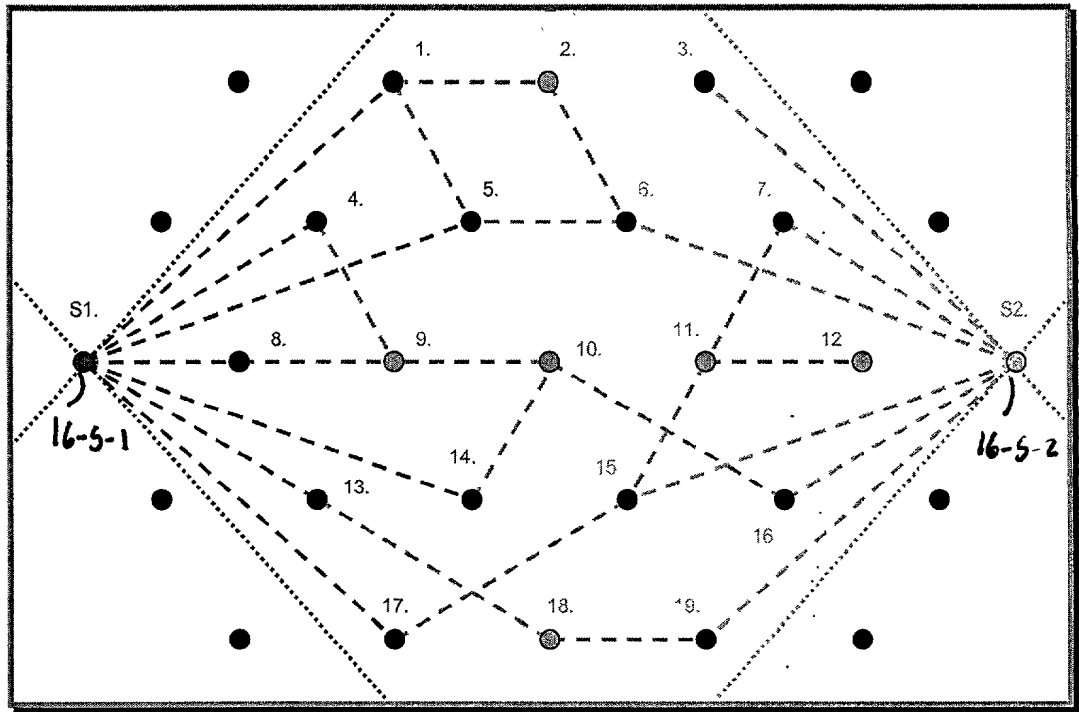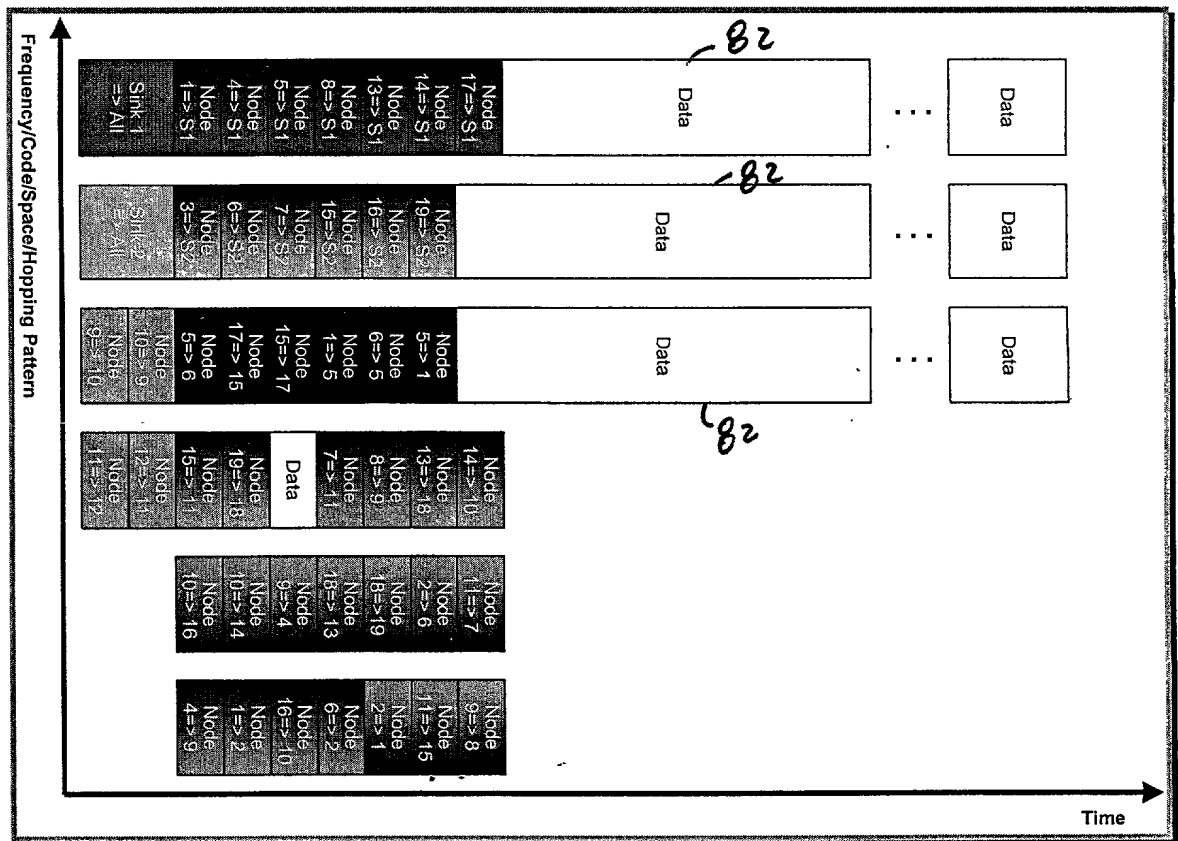
**Figure 24  A PMT network with two sinks**



**Figure 25   PMT control slot & channel allocation example for network in** Error! Reference source not found. **(assuming narrowbeam antennas at nodes).**